FEATURES AND CAPABILITIES OF THE OBSEA

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Abstract
Needs for higher resolution, volume of information and longer data series are becoming increasingly important in oceanographic observation. In some applications traditional observation systems, such as autonomous oceanographic buoys and measurements taken from oceanographic ships, present serious disadvantages regarding costs, volume and delay of data or batteries autonomy. The new cabled underwater observatories can be modular, flexible and adapted to different uses and specifications to satisfy the requirements of the scientific community. The OBSEA project (www.obsea.es) is a collaborative task, between the CSIC (Consejo Superior de Investigaciones Científicas) and the UPC (Universitat Politècnica de Catalunya), to design and develop a seafloor observatory situated in front of the "Vilanova i la Geltrú" (Spain) coast into the marine reserve "Colls Miralpeix". OBSEA is a multiparameter laboratory for oceanographic studies integrated in the coastal zone and a test site for marine equipments included in the European Seafloor Observation Network (ESONET).

Introduction

The OBSEA infrastructure consists of two main installations: the Shore and the Subsea Station. The Subsea Station has all the oceanographic instruments and related electronics for its power supply, communications and control. The management servers, in charge of status monitoring and data collection, are located in the Shore Station. These data servers at Shore continually store the information and provide the interface with the world, giving controlled access to the scientific community.
The main objective of the OBSEA project is to provide a test-bed for the development of oceanographic instrumentation and at the same time have a shallow water observatory providing valuable information to the scientific community. This observatory provides real time data for marine observations keeping a database with historic values. All the instruments are transparently accessible to the users through a TCP/IP connection.
In the first stage the OBSEA observatory is equipped with three instruments: An underwater camera providing real time images from the seafloor, useful for scientific research and monitoring of marine organisms and at the same time, valid for security surveillance. A broadband hydrophone to monitor acoustic emissions from a wide variety of subsea phenomena perfect for condition metering, background noise recording and general marine research. The third installed instrument is a mooring CTD that measures temperature, conductivity and pressure, providing important information on long term salinity and thermal variations as well as tide evolution. Furthermore the OBSEA is not limited to these three sensors as it has free ports that can be used to connect any type of oceanographic instrument. In fact for several months an Acoustic Doppler Current Profiler has been installed in OBSEA for climate studies in Colls Miralpeix integrated coastal zone.

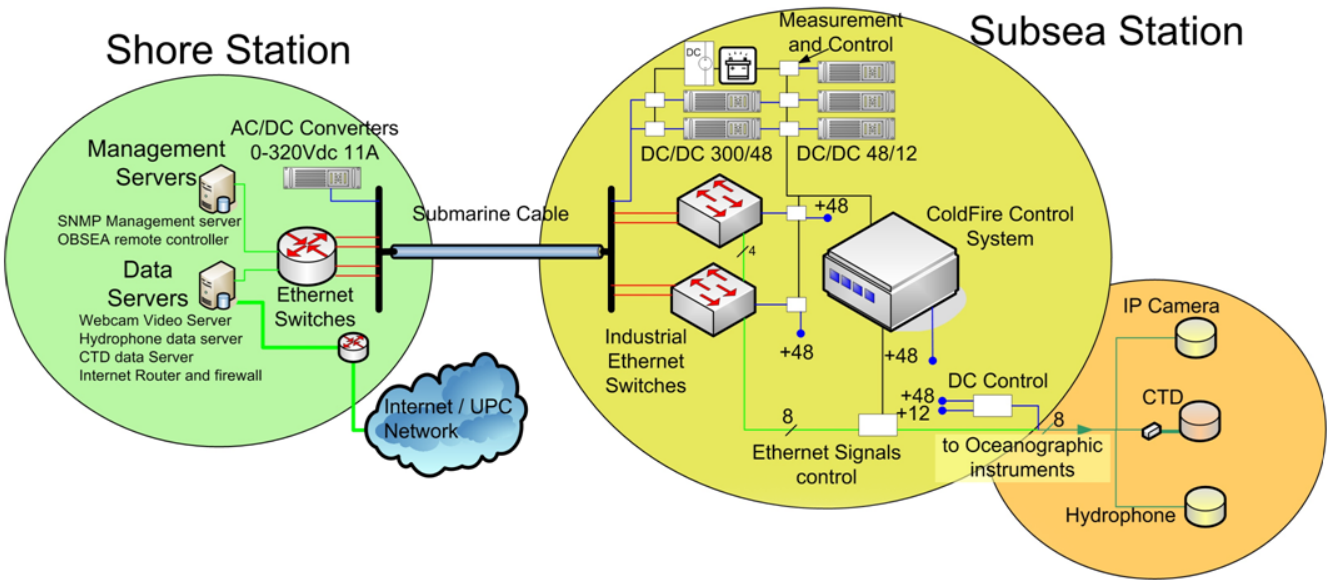

Figure: 1 Diagram of the OBSEA network

Conclusion and results

With OBSEA, a real time observation of multiple parameters in the marine environment is achieved. The main advantage of having a cabled observatory is to provide continuous power to the scientific instruments and to have a high bandwidth communication link.

The OBSEA station is a relatively low cost observatory (700k€), yet very capable that enables investigation and development of marine technology. The received data of the observatory is being stored for future studies and real time transmitted to the interested customers that have investigation projects related to sea observation and climate change. At the moment, there is an agreement for data sharing with the Catalonian Meteorological Institute for climate studies and some research projects have been done in parallel using the OBSEA infrastructure such as Boron measurements for water desalination studies. Noise monitoring has become one of the objectives of ESONET network, to investigate the noise level produced around European coastlines and its impact on the environment, especially in cetaceans. The OBSEA broadband hydrophone is used in the LIDO (Listening to the Deep Ocean Environment) ESONET project.

On the other hand, species identification, biomass estimation and associated behavioural rhythms is acquiring increasing importance for fishery management and biodiversity estimation in continental margin and deep-sea areas. In the past two decades, the number of submarine video-stations has progressively along with socio-economic interest ocean exploration. In this context, expandable Subsea Stations at different depths such as SARTI-UPC's western Mediterranean OBSEA were installed to measure several marine parameters, including videos. Accordingly, the Marine Sciences Institute (ICM) of the Spanish Research Council (CSIC) has elaborated a novel morphometry-based protocol for automated video-image analysis of data from OBSEA camera. This approach accomplishes species identification with Fourier Descriptors and Standard K-Nearest Neighbours analyses on their outlines, and performs animal movement tracking (by frame subtraction), both in the demersal and in the pelagic realm.

Figure: 2 Installation of the OBSEA in the Vilanova i la Geltrú Coast

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